

GeoGRID: An IT infrastructure for geosciences and data analysis of satellite images (1)

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Satellite imagery provides wealthy information to study the surface of our planet, such as the topography, temperatures, vegetation, and mineral. It is getting more and more difficult, however, to manage satellite data sets because observation instruments mounted on recent satellites collect a lot of data and the volume of them is becoming quite huge. For example, an instrument, the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), on the Terra satellite (Yamaguchi et al. 2001) had produced more than 100 terabytes raw data by a five-year operation since the launch in December, 1999. All the data have been maintained in an archive system on a traditional tape library system. With three-year's extended mission period, the archive system will need more than 160 terabyte storage in total to maintain just the raw data. Even if some researchers develop new improved algorithms for geometric/radiometric calibrations and/or atmospheric corrections, a current data archive and distribution system for the ASTER, which is called ASTER Ground Data System (GDS), do not allow the researchers full complete reprocessing of the raw archive due to the limited computing and storage.

In this presentation, we propose a new platform GeoGRID for satellite data processing to overcome the difficulties. We have selected the ASTER GDS for the first target of GeoGRID because many researchers in the National Institute of Advanced Industrial Science and Technology (AIST) of JAPAN have been involved in many aspects of a project for the ASTER, such as the hardware and software design, operation planning, onboard/vicarious calibrations and validation of the products (Fujisada et al. 1998). While the ASTER GDS suffers from tremendous overhead to retrieve the data from the tape archive, GeoGRID will bypasses the bottleneck by applying a very efficient grid file system constructed on a high cost-performance PC cluster system.